

$$\sqrt{234} \quad \rho = \frac{l_0}{\pi a_0^3} e^{-\frac{2r}{a_0}} \quad ; \quad W = \frac{1}{2} \int_V \rho \psi dV$$

$$\Delta \psi = -4\pi \rho$$

$$\psi = A e^{-\frac{2r}{a_0}}$$

$$\Delta \psi = A \frac{4}{a_0^2} e^{-\frac{2r}{a_0}} = 4\pi \cdot \frac{l_0}{\pi a_0^3} e^{-\frac{2r}{a_0}}$$

$$A = -\frac{l_0}{a} \quad ; \quad \psi = -\frac{l_0}{a} e^{-2r/a}$$

$$W = -\frac{1}{2} \int_V \frac{e^2}{\pi a^4} e^{-\frac{4r}{a}} dV = \frac{l_0^2}{2\pi a^4} \int_0^\infty r^2 e^{-\frac{2r}{a}} dr \int_0^{2\pi} d\varphi \cdot$$

$$\int_0^\pi \sin \theta d\theta = \frac{4\pi l_0^2}{2\pi a_0^4} \int_0^\infty r^2 e^{-\frac{4r}{a}} dr = \frac{2l_0^2}{a_0^4} \cdot \frac{2a_0^3}{64} = \frac{l_0^2}{16 a_0}$$